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'Computerized Profiling' of Clinical Language Samples and the Issue of Time

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Profiling is a procedure for describing language usage based on the data of a clinical sample. The procedure has been developed to handle data at several linguistic levels (grammar, prosody, phonology, semantics) so that individuals exhibiting different types of language disability can be profiled or the same individual can be profiled in different ways. The clinical purpose of profiling is 'to enable an accurate assessment of P's disability to be made, sufficient to provide a basis for remedial intervention' (Crystal, 1982, p. 1).

Clinical difficulties with profiling

Profiling is designed as a "compromise" between the theories and methods of academic linguistics and the needs and abilities of the everyday language clinician. To this end, profiling avoids most of the intricacies of formal linguistic notation and does not aim for nearly the same level of detail. In spite of this effort to make the procedure usable, it is, compared to most other clinical practices, difficult and time consuming to learn. The profiling method for grammar, LARSP,

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assumes a familiarity with a reference grammar (Quirk and Greenbaum, 1973) as well as a number of special rules for analyzing immature language forms. The profile for prosody, PROP, uses a specific transcriptional system for recording intonation patterns. PRISM-L, the procedure for analyzing lexical semantic structure, uses a rather complex classification scheme that involves nearly 300 categories. The PROPH procedure for segmental phonological analysis employs a 'broad phonetic' transcription but also makes analytical decisions on the basis of syllable stress, position of the phones, certainty of the word gloss, and frequency of the phonetic form within the sample. The user must be familiar with all of these notions in order to construct a profile accurately.

Even when the technique has been mastered, profiling can take an extraordinary amount of time to do. Crystal (1981, pp. 9-11) is aware of this problem and suggests that the extra time is justified by (a) the complexity of the problem(s) being treated; and (b) the long-term value (i.e. over the entire course of therapy) of the information derived.

Computerized Profiling

Computerized Profiling is an attempt to alleviate (but not eliminate) the problems of 'learnability' and time. The software is designed so that it (a) guides the user step-bystep through the profiling process; (b) provides analytical support by offering 'tentative' analyses of data; and (c) contains instructional text ('help files') to acquaint or reacquaint the user with procedural details. It performs nearly all the necessary tallies and calculations, thereby speeding profile construction. When the profile is complete, the program allows the user to search through data rapidly in order to evaluate clinical hypotheses (for example the productivity of pronoun usage or the consistency of phonological substitutions). The software is not a substitute for linguistic knowledge and clinical skill but is intended as a tool for teaching the profiling method, for constructing profiles within a more clinically practicable span of time, and for improving the interpretation of those profiles.

Hardware

Computerized Profiling operates on PC computers running 32-bit versions of Windows. To run under Windows 7 it requires the installation of Windows XP mode. The program can be configured to read and write data files from the computer's hard drive or from external media such as flash drives.

Software

The software is available for free download from the website http://www.computerizedprofiling.org. Documentation can be accessed from within the program. The documentation, however, serves only to explain the operation of the program. It is assumed that the user is generally familiar with the procedures for profiling.

The software is organized into different modules corresponding to the different types of linguistic analysis they perform. To carry out a LARSP analysis, two of these modules are used and they are briefly described below:

(1) CORPUS is a module for creating a transcript file that can then be analyzed by LARSP and each of the other modules in CP. Sentences are entered into a text processing program, observing some simple conventions for capitalization, punctuation, and the identification of speakers (T and P). The text file is imported into CORPUS and converted into a format that CP uses for its analysis. In this process, certain types of editing required for grammatical analysis (for example the division of contracted forms into two morphemes separated by a space: CAN'T → CAN'T) are performed automatically. All files are stored on disk and can be recalled for editing.

(2) LARSP is a module for the grammatical analysis of spontaneous speech samples utilizing the 1981 revision of the Language Assessment, Remediation, and Sampling Procedure (Crystal et al., 1981; Crystal, 1982). The program automatically performs a tentative parse of each sentence and displays it in the conventional format, for example

	I	‘M	GOING	TO	PLAY	THE	OTHER	GAME	NOW
CL	S	V				O			
SC									
PH	PP	AO	V	V		D	AJ	NN	AV
WD		AX	NG						
ER									
AI	FL								
Spontaneous									

The symbols below the words in the sentence indicate the elements at different levels of structure: S = SUBJECT, PP = Personal Pronoun, AX = Contracted Auxiliary, FL = Full Sentence, etc.

The algorithm for parsing each sentence is hierarchical, i.e. it first analyzes clause structure, then analyzes phrase structure based upon that presumed clause structure, then word structure based on the preceding two levels. Decisions are made on the basis of a 35,000-entry dictionary that identifies the possible grammatical roles of each word. For example, *outline* is listed as both the base form of a verb and a singular noun while *outfits* is the 3s (third person singular present tense) form of a verb as well as a plural noun.

Because the decision-making of the program is sequentially dependent, if a misanalysis occurs at Clause level, it will affect the analysis at Phrase and Word level. The results can be seen in the following sentence:

	THAT	DOES	N'T	SOUND	LIKE	A	COW	TO	ME
CL	S				V	D		A	
SC									
PH	D	AO	NE	V	V	D	NN	PR	PP
WD		3S	NT						
ER									
AI	FL								
Spontaneous									

Because the program's dictionary contained LIKE as a lexical verb but did not contain SOUND, the Verb element was misassigned at clause level. The user must scan each sentence for mistakes like this and then correct the analysis. The task of correcting is made easier, though, by the fact that the program works hierarchically. In the example above, if the clause line is changed to:

	THAT	DOES	N'T	SOUND	LIKE	A	COW	TO	ME
CL	S				V	D		A	

the program will automatically revise the phrase line to:

	THAT	DOES	N'T	SOUND	LIKE	A	COW	TO	ME
CL	S	V			A			A	
SC									
PH	PO	AO	NE	V	PR	D	NN	PR	PP

As each sentence in the corpus file is reviewed and, if necessary, corrected, it is also possible to enter codes that indicate the presence of Stage VI Errors. When the review is complete, the program passes the data through a tabulation routine. This routine examines each sentence, identifies the units at each structural level (for example Clause: SVAA; Phrase: Pron-P, Aux, Neg V, PrDN, PrPron-P; Word: 3s, n't), determines the appropriate stage assignments, interprets the Interaction data (for example S: Spontaneous, R: Full) and then tallies the results. When all of the sentences have been examined, the data are formatted to produce a LARSP profile chart identical to that obtained when the procedure is done by hand.

A set of supplementary programs allows the user (1) to search the examples of utterances with particular constituent features (for example all sentences of SVO clause structure or all sentences containing modal verbs); (2) to construct Verb Valency and Verb-form Profiles (Fletcher, 1985); (3) to compare separate analyses of the same corpus file (for example a student's and an instructor's or two researcher's wishing to check their reliability); and (4) to change the dictionary of lexical verbs or Minor sentences that the program uses during its automatic parse.

Program Evaluation

As an implementation of existing procedures, Computerized Profiling can best be judged by its success rate, by its speed in comparison to profiling by hand, and by the ease with which it can be learned.

Learning the Software

No measurement has been made of how quickly Computerized Profiling can be mastered. Individuals who are previously familiar with profiling typically have little trouble, once they have adjusted to the program's symbols (for example, IV for Verbimp AJ instead of Adj for Adjectival). As with virtually all software that relies on keyboard data entry, the program favors those who are skillful typists. Students and others who are first learning to profile often find that the program promotes systematic work habits and helps to maintain motivation by eliminating the tedium of counting and tallying.

The Issue of Time

The authors of LARSP have consistently made mention of the time requirements for this and other clinical profiling procedures. However, a good deal of variation can be found in their time estimates, as they focus more or less on different factors likely to slow down the process. In their first text on LARSP, Crystal, Fletcher, and Garman (1976: 24) admit that 'The hard fact of the matter is that if one wants to achieve a complete and accurate understanding of a syntactic disability, there is no alternative but to spend analytic time on it—perhaps 3 or 4 hours, in order to obtain a reasonably full analysis of a half-hour sample'. Three years later, Crystal (1979: 21) concluded that 'If T does all the work herself, it will take the best part of a morning to get from transcription to complete profile, and this is impracticable in several clinical settings'. Two years after that, Crystal (1981: 10) made clear the range of possibility by stating, 'While it is possible to do certain types of analyses on certain types of patient in an hour or so, anything at all complex will regularly require a commitment of a half-day or a whole day'.

To investigate in more detail the time required by LARSP a study was organized to compare manual and computerized implementation of the procedure (Long, 2001). The participants were 256 students and practicing speech-language pathologists from the USA and Australia. All participants had received university-level instruction on the analysis procedures they performed for this study. That instruction had occurred as recently as two months and as remotely as 11 years prior to participation. Participants were allowed to select the number and type of analyses they performed and were cautioned to choose only those analyses with which they felt 'familiar and confident' as a result of previous instruction and practice with the procedures.

All participants reported previous experience in using computers, though no attempt was made to quantify this experience. Given the number of participants, their relatively young age, and their university education, it can be safely assumed that they were generally accustomed to computer technology but that their specific experiences had been diverse, as is characteristic of any cohort of individuals.

Language samples

Grammatical analyses were performed on three language samples. All the samples were typed according to normal orthographic conventions. Decisions regarding utterance boundaries, sentence types (i.e. final utterance punctuation), proper nouns (i.e. capitalised words), mazes, and lexical boundaries had been made in the transcripts and participants were asked to abide by these decisions in their analyses. All the samples were elicited in conversational interactions. Sample G1 was obtained from a girl of 4;3 years being seen for therapy in a university clinic. Her diagnosis was simply 'language disorder'. Sample G2 was a boy of 2;10 years with specific expressive language impairment. He was identified as Child 7 in Long, Brian, Olswang, and Dale (1997). Sample G3 was a typically-developing girl of 8;3 years who was a participant in Channell and Johnson (1999). The variation in sample size, complexity/severity, utterance variability, and suitability for different grammatical analyses is shown in table 1.

insert table 1 about here

Manual analysis procedures

For every sample they were to analyse by hand, participants were given the printed transcript, an instruction packet detailing what was to be included in the completed analysis, a time log, and a form to be used for recording and tabulating the analysis data. Participants were allowed to use hand calculators and to complete the analyses whenever and wherever they chose. They recorded the starting and stopping time of each analysis to the nearest minute. They could take breaks of any duration as long as these were noted in the time log.

The recording form used was developed especially for this study but was similar in design to that shown in Crystal (1981. Although the use and purpose of the form was explained in the instruction packet, participants could choose to use their own form and procedures, if they thought these would be more efficient. Any time devoted to creating or modifying record forms was not added to the time log. The only requirement was that the final form of the analysis had to be as shown in the instructions. When they had completed the analysis, participants turned in their analysis results, recording and tabulation form, and time log. If the analysis results were not in the proper form, they were returned for correction and the additional time was added to the log. Final time measurements were calculated from the log.

Computer analysis procedures

All language analyses performed by computer utilised the relevant modules of Computerized Profiling (CP, Long, Fey, and Channell, 1996-2000). Participants were introduced to the software either in the context of a university course or a professional workshop. After completing a brief tutorial exercise, all participants had performed at least one full analysis with CP prior to the analysis done for this study.

As this study was primarily focused on the analysis phase of language sample analysis, participants were given grammatical samples as electronic text files. Thus, they had to follow the procedures for importing a text file into CP but did not have to type in the transcript itself.

As they did with their manual analyses, participants recorded in a time log their starting and stopping times and all breaks taken. At the conclusion of the analysis they turned in this log and the hardcopy or disk file output from CP. An example of the computer-generated LARSP profile is shown in Figure 1.

LARSP analysis

A LARSP profile was constructed following the procedures described by Crystal, Fletcher, and Garman (1976) and elaborated by Crystal (1979, 1981). The 1981 revised profile chart was used but Section D ('Reactions') was not completed. When the LARSP was done by hand the totals at the bottom of the chart were not calculated and participants were only asked to record occurrences with tally marks on the profile chart. They did not have to record which structures were tallied for each utterance.

Order of analyses

For every language analysis undertaken participants analysed the same transcript twice, once by hand and once by computer. This allowed for direct comparison of manual and computer times without introducing variation due to individual knowledge and experience. However, it also meant that an order effect was inevitable. Because it was anticipated that computer analysis would prove more time efficient, the decision was made to bias the study against this effect. Therefore, participants always performed the computer analysis first, thereby ensuring that any advantage gained through previous exposure to the sample would serve to reduce the times for manual analysis.

Accuracy of analyses

A computerized procedure for LARSP analysis, even if it was time efficient, would be meaningless if the gains in efficiency occurred at the expense of accuracy. A comparison was therefore made on six of the separately-timed analyses performed for this study. For each of the six analyses, the manual and computerised results were compared to a key prepared by the author. Grammatical analyses were compared by reviewing each of the LARSP profiles and awarding a point to the procedure, manual or computerised, found to be more accurate. In the case of ties, half a point was awarded to each procedure.

Although this procedure did not yield point-by-point comparison of all the linguistic judgements rendered in performing manual and computerised analysis, it did provide a clear picture of their relative accuracy. Out of a possible 6 accuracy points, the computerised procedure received 5 of them. The only accuracy points going to the manual procedure were the result of ties.

Efficiency of analyses

Table 2 shows the time spent by participants completing LARSP analyses on the three different samples. There is no question of the time efficiency of computerized grammatical analysis relative to manual analysis. In general, the least grammatically complex sample, G2, was the fastest to analyse.

insert table 2 about here

The relationship between manual and computerised analysis times among the individual participants is revealed in table 3, which shows the correlation between the two times for each analysis of each sample. As can be seen, they are strongly and significantly correlated for the manual and computerized LARSP analyses.

insert table 3 about here

Discussion

Foremost among its findings, this study quantifies exactly how much time clinical language sample analysis requires. It should be recalled that, because of the order in which the two analyses were performed, the time taken for manual analysis may have been somewhat underestimated and the time for computerised analysis somewhat overestimated. Nevertheless, any bias in estimation that may have occurred would merely add support to the conclusions derived here.

Although there was variation in the amount of time needed for different analyses and different samples, it is clear from this study's results that language analysis, if it is done by hand and is intended for use in treatment planning, is a procedure that will not be regularly possible in most clinical schedules. Regrettably, this finding contravenes the need for language analysis.

The clinical need for grammatical analysis can be seen in caseload data. Caseload statistics reveal that developmental language disorders make up a sizeable percentage of cases seen. Developmental language cases are seen by 75.4% of all clinicians and each of those clinicians sees an average of 13.9 such cases.[1] We do not know how often or how extensively grammatical analysis is being performed. We might assume, pessimistically, that the only analyses performed routinely are MLU and descriptive statistics such as the number of different sentence types and the number of complete and intelligible utterances, even though these are general measures that cannot serve as the basis of treatment planning (Crystal, Fletcher, and Garman, 1976; Paul, 1995; Miller, 1996). A study conducted with the same group of clinician participants has indicated that these tasks can be completed on a sample of about 100 utterances in 6-16 minutes by an efficient clinician and in no more than 41 minutes by an inefficient one (Long, 2001). The time range for an efficient clinician seems to fit comfortably into a typical work schedule. Whether the analysis time could be absorbed by an inefficient clinician is less certain. Either way, it bears repeating that these are the times for a minimal grammatical analysis, one that does not address many of the treatment needs raised by patients with language disorders.

If those needs are to be met, a more extensive type of grammatical analysis, such as LARSP, is required. LARSP is a procedure best applied to children somewhere between productive word combinations and elaborated complex sentences. It can be used to establish a profile of a child's abilities across grammatical processes such as negation, question formation, noun and verb phrase elaboration, and pronominalization. LARSP is very carefully graded developmentally, which leads the clinician smoothly from analysis to the formulation of treatment goals based on developmental logic (Fey, 1986).

The time needed for manual LARSP analysis of a 100-utterance sample can be estimated from this study, with consideration given to the factors of clinician efficiency and sample complexity/severity. When performed on a linguistically immature child, it could be accomplished in 12 minutes to 2.5 hours, a range that begins within most clinicians' comfort zone for time but finishes well outside it. On more mature samples (G1 and G3), LARSP shows an even greater range, from 19 minutes to over 5.5 hours.

Based on all the manual analyses performed for this study, three conclusions appeared warranted. First, there is a clear effect of sample complexity/severity on analysis time. A clinician evaluating the grammar of a linguistically immature child is in a far better position to fit a manual language analysis into a busy clinical schedule.

Second, the effect of clinician efficiency is considerable for grammatical analysis. This can be seen in the ratios of maximum:minimum times for manual analyses, shown in Table 2. These ratios were 2 or greater for all samples and surpassed 5 in the most extreme case. It is as a result of these large ratios that the performance times for grammatical analysis fell so clearly both inside and outside of practical time limits for clinical application. The implication of this finding is that clinicians whose early experiences with manual grammatical analysis are inefficient—and therefore discouraging—might reasonably conclude that the procedure is unfeasible for clinical use.

The third conclusion to be drawn from this study's manual analyses is that the time requirement for language analysis varies with the kind of analysis performed. In particular, those analyses that provide information most useful to treatment planning, because of their structural and developmental organisation, are also the analyses that consume the most clinician time. Thus, if these analyses are to be attempted by hand, the justification must be that they will allow clinicians to construct principled programs of therapy that will prove, in the long-term, to be both more effective and time-efficient (Crystal, 1981).

Put together, these three conclusions suggest that the only manual grammatical analysis procedures likely to be time efficient are simple structural counts performed by efficient clinicians on samples obtained from children with very young language ages. But is the picture really this bleak? In many commentaries on clinical language analysis, it is mentioned or even advocated that 'shortcuts' be used to reduce the time of the task (Crystal, 1979; Paul, 1995; Tyack and Venable, 1999). These shortcuts include such steps as scanning for but not tallying structural forms, omitting parts of an analysis procedure that have less relevance to the designated objective of assessment or treatment planning, or putting a ceiling on tallies when either productivity or a linguistic problem area have already been clearly identified. Where the rub comes with these recommended shortcuts is that, in most instances, they rely on the experience of the individual doing the analysis. In other words, a shortcut is most likely to be implemented by someone who recognises patterns in the linguistic data early on and can draw an appropriate conclusion without completing all the tallies or including all portions of the procedure. Such skills of recognition are usually nurtured by experience, meaning that students and new practitioners will find shortcuts difficult to apply.

Another solution to the problem of time is to perform language analysis with the aid of software. The results of this study are unmistakable: language analysis software saves time for every clinician who uses it. The only question is how much time and, as with manual analysis, we find the factors of individual efficiency and type of analysis to be pertinent. If we use the ratio of manual:computerised time as an index of the time saved by using software, it is apparent that some individuals benefited more than others, as the maximum:minimum ratio for LARSP analyses ranged from 1.6 to 7.6.

What, then, can be said to a clinician who wants to employ clinical language analysis but fears—justifiably, as the findings from this study have shown—that it might consume too much time out of a clinical schedule? The best news is that computerisation has brought language analysis within reach of nearly all clinician timetables. The longest average time to perform a computer-assisted LARSP analysis on one of the three samples was 64 minutes. Even the maximum times were under an hour, with the exception of two LARSP analyses that took as long as 71 and 98 minutes, respectively. That said, the decision to use software probably should consider factors other than time alone. Clinicians who are proficient at linguistic analysis are able to perform manual procedures such as LARSP more efficiently. This study found that those same clinicians will achieve the lowest times for computerised analysis. These individuals should find themselves able to perform grammatical analysis on the computer in 10-45 minutes, depending on the specific procedure and complexity/severity of the sample. However, clinicians who perform these analyses inefficiently by hand may need as much as 98 minutes even when software is used. Computerisation may not bring a more comprehensive grammatical analysis such as LARSP into the time budget of such clinicians.

Ultimately, what may most influence a clinician's decision to use grammatical analysis software is the belief in nonstandardized assessment as the basis for treatment planning and as a repeated measure to judge the effectiveness of treatment. One of the main benefits of computerised grammatical analysis, beyond the time it saves, is the capability it provides the clinician to evaluate productivity through a variety of search and sort operations (Long, 1999). This study did not directly measure the time savings that can be achieved by performing productivity analyses on the computer, but the efficiency of this approach seems beyond question. The argument that clinicians will reap the rewards of comprehensive grammatical analysis in the long-term efficiency of therapy is only made more persuasive when the time needed is markedly reduced, the level of accuracy remains the same or better, and the analytical power of the procedure is extended.

The most obvious limitation on the use of computerised language analysis is the availability of the computer itself. At least some clinicians, or their employers, have yet to view the computer as an essential clinical tool. However, if nonstandardized procedures are considered to be an important component of language assessment, the results of this study provide a straightforward rationale for computer acquisition. By using the manual to computerised time ratios in Table 2, the potential time savings can be calculated for any clinical caseload. This time, it can be argued, should be put to better clinical use.

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Footnotes

1 This includes only cases classified under Childhood Language Disorders as 'Other (including specific language impairment)'. Additional cases for which grammatical analysis might be appropriate fall under the ASHA (1999) survey categories of Autism/PDD, Disorders resulting from attention deficit hyperactivity (ADHD), and Learning disabilities.

Table 1. Size and complexity/severity of grammatical samples analysed

	Sample G1	Sample G2	Sample G3
syntactic utterance types (C&I)	63	25	98
syntactic utterance tokens (C&I)	67	33	98
all utterance types (C&I)	74	67	99
all utterance tokens (C&I)	99	126	99
statements (C&I)	86	125	83
questions (C&I)	4	1	8
commands (C&I)	9	0	8
MLU	3.64	1.33	7.63

Note. Dashes indicate an analysis that was not performed. See text for explanation. C&I = complete and intelligible.

Table 2. LARSP analysis: manual and computerised times

	Sample G1				Sample G2				Sample G3			
	N	range	mean	max: min	N	range	mean	max: min	N	range	mean	max: min
	33.0				37.0				32.0			
manual		77.0-305.0	185.0	4.0		34.0-155.0	97.2	4.6		80.0-334.0	199.1	4.2
computerised		18.0-71.0	44.8	3.9		15.0-50.0	32.0	3.3		37.0-98.0	64.3	2.6
manual: computerised		2.8-7.6	4.2*	2.7		1.6-6.3	3.1*	3.9		1.7-5.0	3.1*	2.9

Note. All times are in minutes; max:min = ratio of maximum to minimum time.
* $p < 0.0001$

Table 3. Correlations between manual and computerised times

	Sample G1	Sample G2	Sample G3
LARSP	.82*	.65*	.78*

* $p < 0.001$

Figure Captions

Figure 1. LARSP profile generated by Computerized Profiling software.

LARSP Profile

Filename: G3
Age: 4 years 3 months
Date: 11-16-1995
Type: conversation between clinician and child
Tabulation Method: Standard
Range of Utterances: All
Error Set: Standard LARSP Errors

A UNANALYZED:	Unintelligible 3	Symbolic Noise ·	Deviant ·
PROBLEMATIC:	Incomplete 3	Ambiguous ·	Stereotypes 1

B RESPONSES		NORMAL RESPONSE						ABNORMAL		
		Major								
TOTALS	Repet-itions	Elliptical 1	2	3+	Red-uced	Full	Minor	Struc-tural	ϕ	Prob-lems
26 Quest	11	6				5	15			
45 Other	12	5	3	2	1	18	16			
C 28 Spont	2	1			1	24	2			

I 0;9-1;6 II 1;6-2;0 III 2;0-2;6 IV 2;6-3;0 V 3;0-3;6 VI 3;6-4;6 VII 4;6+

M I N O R Responses 25 Vocatives 2 Other 6 Problems ·

	C O M M	Q U E S T	S T A T E M E N T		
–	'V' 2	'Q' ·	'V' · 'N' ·	Other ·	Problems ·

CONN	CLAUSE			PHRASE	WORD
– –	VX 3	QX ·	SV 6 AX 5 SO · VO · SC 1 VC · Neg X · Other ·	DN 11 VV 6 AdjN 1 VPart 1 NN 2 IntX 5 PrN · Other 15	-ing 5 pl 10
	X+S:NP 5	X+V:VP 4	X+C:NP 1 X+O:NP ·	X+A:AP 4	-ed 2 reg · irr 2
– – –	VXY 1 Let XY · Do XY ·	QXY · VS(X) 4	SVC 2 VCA · SVO 12 VOA · SVA 4 VOdOi · NegXY · Other 2	DAdjN · Cop 10 AdjAdjN · Aux-M 9 PrDN 6 Aux-O 10 Pron-P 43 Other 11 Pron-O 29	-en 2 3s 5 reg · irr 5
	XY+S:NP 4	XY+V:VP 11	XY+C:NP 2 XY+O:NP 7	XY+A:AP 3	gen ·
> –	+S · VXY+ 1	QVS 1 QXY+ · VS(X+) 2 tag ·	SVOA 7 AAXY 1 SVCA · Other 1 SVOdOi · SVOC ·	NPPrNP 1 NegV 4 PrDAdjN · NegX 1 cX · 2 Aux · XcX · Other	n't 3 'cop 2
and 16 c 2 > s 4 Other ·	Coord · Other ·	Coord · Other ·	Coord-1 2 -1+ · Sub A-1 · -1+ · Sub S · Sub C · Sub O · Comparative · Postmod Cl-1 ·	Postmod Phr-1+ ·	'aux 2 -est · -er ·

```
|          |          | Postmod Cl-1+ ·  |                      |-ly ·
--------------------------------------------------------------------------
   (+) Passive ·          Complement-C ·     Initiator 3      Complex VP 3
       how ·              what ·             Coord NP 1       Complement-P
--------------------------------------------------------------------------
_  (-) and- ·     conn- ·     sub- ·     Elemϕ 20   Elem-> ·   Conc- ·    Det- ·
>      Dϕ ·       D-> ·       Prep- ·    Prϕ ·      P-> ·      Pron- ·    Modal- ·
       Aux- ·     Auxϕ ·      Cop- ·     Irr N- ·   Reg N- ·   Irr V- ·   Reg V- ·
       Other ·                           Ambiguous ·
--------------------------------------------------------------------------
   it ·    there 1    A Connectivity 1    Comment Clause ·    Emphatic Order ·
--------------------------------------------------------------------------
```

	Complete & Intelligible	Total	LARSPed
P Sentences	99	105	98
		(3 Incomplete, 3 with Xs)	
P MLU in words	3.44	3.50	3.43
P MLU in morphemes	3.64	3.68	3.62
P MSL (Klee, 1992)	4.84	-----	-----
Spontaneous Sentences	-----	-----	23.5%
Adequate Responses	-----	-----	100.0%
Mean P Sentences/Turn		1.48	
Mean T Sentences/Turn		1.41	
P Sentences/T Sentences		1.05	
T Sentences		100 (25 Question, 46 Other)	
T MLU in words		4.38	

	Number	% of Clauses		Number	% of Phrases
Stage I Clause	11	16.2%	Stage I Phrase	78	31.3%
Stage II Clause	15	22.1%	Stage II Phrase	41	16.5%
Stage III Clause	25	36.8%	Stage III Phrase	118	47.4%
Stage IV Clause	13	19.1%	Stage IV Phrase	5	2.0%
Stage V Clause	2	2.9%	Stage V Phrase	0	0.0%
Stage VI Clause	0	0.0%	Stage VI Phrase	7	2.8%
Stage VII Clause	2	2.9%			
Mean Clausal Complexity		2.91	Mean Sent Complexity - Phrase		8.73

Major sentences that are complex	2/ 66	3.0%
Clauses with 2+ expansions	14/ 68	20.6%
Verb phrases expanded	24/ 55	43.6%

Syntactic complexity score (Blake & Quartaro, 1990): 2.84